

dates of occurrence of fog near the Grand Banks numbered 2 less than the average; between the 55th and 65th meridians 3 less than the average; and west of the 65th meridian 6 less than the average. On the dates fog was reported east of the 65th meridian it occurred with the approach or passage to the northward of general storms. On the dates fog was reported

west of the 65th meridian, the 15th and 16th, it was encountered off the New Jersey coast with rain and unsettled weather. On the 7th, 9th, 14th, 17th, and 30th, dense fog occurred at Signal Service stations on the New York and New England coasts with the advance over the Lake region or the Saint Lawrence Valley of storms whose influence extended off the coast.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for November, 1890, is exhibited on chart II by dotted isotherms. In the table of Signal Service data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature was highest over south Florida, where it was above 70, and the mean values were above 60 on the South Carolina and Georgia coasts, along the Gulf coast, in the lower Gila valley, in the Colorado Valley from extreme south Nevada southward, and generally in California south of the 34th parallel. The mean temperature was lowest in extreme north Ontario, and at elevated stations in west-central Colorado, where it was below 25, and the mean readings were below 30 in the lower Saint Lawrence valley, north Maine, north Ontario, at extreme northern upper lake stations, in north Minnesota and northeast North Dakota, in the British Possessions north of North Dakota, and from central Wyoming southward over west-central Colorado. The mean temperature was below 40 north of a line traced from south New England westward to central Colorado, thence southward to central New Mexico, thence irregularly northwestward to west-central Nevada, and east of this line continued northward over Oregon and Washington.

The mean temperature was above the normal except from Lakes Ontario and Huron eastward over New England and the Saint Lawrence Valley, in extreme south Florida, and in extreme southeast Arizona. The greatest departure above the normal temperature was noted in north North Dakota and Montana and the British Possessions to the northward, where it exceeded 10, and the departure above the normal exceeded 6 in the upper Missouri and Red River of the North valleys, at stations in Tennessee and the east Gulf states, in the Sacramento Valley, and on the south Pacific coast. In districts where the mean temperature was below the normal the departure was less than 2.0, save at Albany, N. Y., and Portland, Me., where it was 2.6 and 2.1, respectively.

At stations in the Atlantic coast states between the 30th and 40th parallels, in the east Gulf states, the lower and middle Mississippi and Ohio valleys, on Lake Erie, in the middle and upper Missouri and Red River of the North valleys, and on the middle and south Pacific coasts the current month was the warmest November in the history of the Signal Service. In the middle and south Atlantic and east Gulf states the mean temperature was 0.5 to 4.0 higher than previously reported for November; in the lower Mississippi valley 0.2 to 2.6 higher; in the Ohio Valley 0.5 to 1.6 higher; in the middle Mississippi valley 0.1 to 0.2 higher; in the Missouri Valley 0.4 to 1.8 higher; and on the middle and south Pacific coasts 0.4 to 4.1 higher. In November of preceding years the highest mean temperature occurred over the middle and northern plateau regions and on the northeast slope of the Rocky Mountains in

1885; in the interior of the south Atlantic states in 1883; along the middle and south Atlantic coasts in 1881; from Texas northeastward to the middle Ohio valley in 1879; from the northeast and middle-eastern slopes of the Rocky Mountains eastward over the upper lakes, and over north California in 1878; in Oregon in 1877; and in the east Gulf states in 1875.

The coolest November in the history of the Signal Service occurred in North and South Carolina and over the entire country west of the Rocky Mountains, save in Arizona and California south of the 40th parallel, in 1880, when the departures above the normal varied from 2 to 10 in the lower Mississippi valley and in the Gulf states; from 5 to 11 in the middle and upper Mississippi and Ohio valleys and the Lake region; 5 to 10 in the Missouri Valley; from 6 to 15 in the middle plateau region and on the middle-eastern slope of the Rocky Mountains, and from 3 to 6 on the middle and north Pacific coasts. The coldest November noted in New England, New York, and Pennsylvania occurred in 1873, when the mean was 5 to 9 below the normal; and from north Florida and east Georgia northward over east Tennessee, and thence eastward over south Virginia in 1872, when the mean was 4 to 6 below the normal.

DEVIATIONS FROM NORMAL TEMPERATURE.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for November for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for November, 1890; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for November, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Nov.	(2) Length of record.	(3) Mean for Nov., 1890.	(4) Departure from normal.	(5) Extreme monthly mean for Nov.			
						Highest.	Year.	Lowest.	Year.
<i>Arkansas.</i>			<i>Years</i>						
Lead Hill.....	Boone.....	46.9	9	51.2	+ 4.3	51.2	1890	44.1	1889
<i>California.</i>									
Sacramento.....	Sacramento..	52.6	37	44.9	- 7.7	57.5	1873	44.9	1890
<i>Connecticut.</i>									
Middletown.....	Middlesex....	39.4	24	39.5	+ 0.1	45.1	1859	31.6	1873
<i>Florida.</i>									
Merritt's Island..	Brevard.....	67.6	8	71.3	+ 3.7	73.3	1883	60.0	1885
<i>Georgia.</i>									
Forsyth.....	Monroe.....	56.1	15	61.7	+ 5.6	61.7	1890, '74	51.0	1880
<i>Illinois.</i>									
Peoria.....	Peoria.....	39.6	34	44.2	+ 4.6	44.6	1867	30.2	1880
Riley.....	McHenry.....	33.6	34	38.4	+ 4.8	40.3	1865	24.1	1880
<i>Indiana.</i>									
Vevay.....	Switzerland..	43.5	25	48.0	+ 4.5	48.7	1879	33.0	1869
<i>Iowa.</i>									
Cresco.....	Howard.....	28.5	18	33.6	+ 5.1	34.7	1878	19.2	1880
Monticello.....	Jones.....	33.5	35	37.5	+ 4.0	41.5	1859	24.4	1863
Logan.....	Harrison.....	35.8	16	41.9	+ 6.1	41.9	1890	27.5	1880
<i>Kansas.</i>									
Lawrence.....	Douglas.....	39.9	22	44.1	+ 4.2	45.8	1878	31.6	1880
Wellington.....	Sumner.....	41.0	11	45.2	+ 4.2	45.5	1879	29.0	1880
<i>Louisiana.</i>									
Grand Coteau....	Saint Landry..	59.4	8	60.8	+ 1.4	64.0	1883	56.2	1889
<i>Maine.</i>									
Orono.....	Penobscot....	33.8	20	34.7	+ 0.9	38.6	1889	27.1	1875
<i>Maryland.</i>									
Cumberland.....	Allegany.....	39.9	31	44.3	+ 4.4	44.7	1883	32.7	1869
<i>Massachusetts.</i>									
Amherst.....	Hampshire....	38.3	54	37.6	- 0.7	44.1	1849	29.7	1873
Newburyport....	Essex.....	39.8	12	39.0	- 0.8	42.1	1889	36.5	1880
Somerset.....	Bristol.....	40.6	18	42.5	+ 1.9	45.2	1889	33.0	1873

Deviations from normal temperature—Continued.

State and station.	County.	(1) Normal for the month of Nov.	(2) Length of record.	(3) Mean for Nov., 1890.	(4) Departure from normal.	(5) Extreme monthly mean for Nov.			
						Highest.	Year.	Lowest.	Year.
<i>Michigan.</i>		°	Years	°	°	°		°	
Kalamazoo	Kalamazoo	36.9	14	43.4	+ 6.5	43.4	1890	27.0	1880
Thornville	Lapeer	37.9	13	39.5	+ 1.6	45.4	1877	28.4	1880
<i>Minnesota.</i>									
Minneapolis	Hennepin	29.0	25	34.0	+ 5.0	36.3	1870	17.4	1880
<i>Montana.</i>									
Fort Shaw	Lewis & Clarke	33.4	22	41.7	+ 8.3	43.3	1867	19.9	1871
<i>New Hampshire.</i>									
Hanover	Grafton	34.1	53	32.6	- 1.5	41.6	1849	24.8	1873
<i>New Jersey.</i>									
Moorestown	Burlington	41.9	27	43.6	+ 1.7	45.3	1888	36.2	1873
South Orange	Essex	41.2	20	41.3	+ 0.1	44.5	1885	32.6	1871
<i>New York.</i>									
Cooperstown	Otsego	34.9	36	34.7	- 0.2	38.5	1876, '77	26.8	1873
Palermo	Oswego	35.3	36	36.9	+ 1.6	41.9	1859	26.8	1873
<i>North Carolina.</i>									
Lenoir	Caldwell	45.0	18	49.8	+ 4.8	49.8	1890	39.9	1872
<i>Ohio.</i>									
N'th Lewisburgh	Champaign	39.3	58	43.7	+ 4.4	49.0	1849	29.0	1874, '80
Wauseon	Fulton	35.9	20	40.8	+ 4.9	40.8	1890	27.9	1880
<i>Oregon.</i>									
Albany	Linn	43.9	11	44.3	+ 0.4	47.4	1884	40.7	1880
Eola	Polk	43.0	20	45.2	+ 2.2	49.6	1889	37.6	1872
<i>Pennsylvania.</i>									
Dyberry	Wayne	34.7	22	35.6	+ 0.9	38.3	1883	25.7	1873
Grampian Hills	Clearfield	35.1	26	39.2	+ 4.1	39.2	1899	28.3	1869
Wellsborough	Tioga	38.8	11	36.2	- 2.6	41.4	1885	36.2	1890
<i>South Carolina.</i>									
Statesburgh	Sumter	53.7	9	58.2	+ 4.5	58.2	1890	51.2	1882
<i>Tennessee.</i>									
Austin	Wilson	47.7	20	52.9	+ 5.2	54.5	1879	40.2	1872
<i>Texas.</i>									
New Uim	Austin	58.9	18	61.0	+ 2.1	65.6	1879	49.6	1880
<i>Vermont.</i>									
Stratford	Orange	33.3	17	34.6	+ 1.3	37.9	1886	23.4	1873
<i>Virginia.</i>									
Birdsneest	Northampton	49.7	22	51.7	+ 2.0	55.6	1881	43.0	1869
<i>Washington.</i>									
Fort Townsend	Jefferson	42.8	15	46.1	+ 3.3	47.3	1884	39.2	1880
<i>Wisconsin.</i>									
Madison	Dane	33.1	21	38.4	+ 5.3	45.0	1864	23.4	1861

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported by a regular station of the Signal Service was 96, at Los Angeles, Cal., on the 3d. The maximum temperature was above 90 at Rio Grande City, Tex., Yuma, Ariz., and San Diego, Cal., and rose above 80 north of a line traced from the North Carolina coast irregularly westward to extreme west Texas, in the lower Gila and lower Colorado valleys, in California south of the 36th parallel, and in the San Joaquin and Sacramento valleys. The maximum temperature was lowest in extreme north upper Michigan, where it was below 50, and it was 60 or below on the southeast New England coast, and north of a line traced from the west Maine coast irregularly westward to northeast Iowa, and thence northwestward over northeast North Dakota. The maximum temperature was also below 60 in extreme northwest Washington. The reports of United States Army post surgeons and voluntary observers show the following maximum temperatures in states or territories where temperature rising to or above 90 was reported: Pomona, Cal., 102; Casa Grande and Fort Lowell, Ariz., 98; Fort Ringgold, Tex., 93. At stations in Va., Ga., Tenn., Tex., S. Dak., Mont., Wash., Oregon, Cal., and Ariz., the maximum temperature was as high or higher than previously reported for November.

The lowest temperature reported by a regular station of the Signal Service was -2, at Saint Vincent, Minn., on the 8th. The minimum temperature was below 10 in north New England, and north of a line traced from west-central Wisconsin irregularly southwestward to north-central New Mexico, thence west of north to southwest Wyoming, thence southward over southwest Utah and east Nevada, and east of this line continued northward over Idaho and west Montana. The minimum temperature was below 40, except in Florida south of the 30th parallel, along the west Gulf coast, in the lower Colorado valley, in south California, and along the Pacific coast south of the 38th parallel. The highest minimum temperature was 65, at Key West, Fla., and the minimum values

were above 50 over Florida south of the 27th parallel. The reports of United States Army post surgeons and voluntary observers show the following minimum temperatures in states and territories where temperature falling to or below zero was reported: Breckenridge, Colo., -20; Camp Pilot Butte, Wyo., -11; Fort Niobrara, Nebr., -8; Pine River and Pokegama Falls, Minn., -7; Woonsocket, S. Dak., -6; Fort Pembina and Steele, N. Dak., -2.

LIMITS OF FREEZING WEATHER.

The southern limit of freezing weather is shown on chart IV by a line traced from the North Carolina coast near Kitty Hawk west-southwest to southeast Mississippi, thence northward to east-central Missouri, and thence southwestward to the middle Rio Grande valley. The western limit is shown on this chart by a line traced from south-central Arizona northwestward to extreme northwest California, and by a second line traced along the immediate coast of southwest Washington.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature are given in the table of Signal Service data. The greatest monthly ranges of temperature occurred in the middle Missouri valley, where they exceeded 70, whence they decreased eastward to less than 40 on the New England coast, southeastward to less than 20 over extreme south Florida, southward to 30 on the west Gulf coast, southwestward to less than 50 on the extreme south Pacific coast, and westward to less than 40 on the middle Pacific coast, and to less than 30 on the north Pacific coast.

FROST.

The first killing frost of the season was reported as follows: 1st, Auburn and Bermuda, Ala.; Augusta and Forsyth, Ga.; Jeffersonville, Ind.; Atlantic City, N. J.; New Berne, Weldon, Southport, and Wilmington, N. C.; Kingston, Tenn.; Lynchburgh, Norfolk, and Stanardsville, Va.; Parkersburgh, W. Va. 3d, Sedan, Kans. 4th, Mobile, Ala.; Shreveport, La.; Washington, Miss.; Corsicana, Tex.; Birdsneest and Lexington, Va. 5th, New London, Conn.; Block Island, R. I. 6th, Astoria and Portland, Oregon; Lapush and Walla Walla, Wash. 7th, Eureka, Georgetown, and Grass Valley, Cal. 8th, Tucson, Ariz.; Eagle Grove, Iowa. 9th, Fort Grant and Grand Central Mill, Ariz. 13th, Bisbee, Ariz. 15th, Natural Bridge, Ariz. 16th, Fort Bowie, Ariz.; El Paso, Tex. 17th, Fort Thomas, Ariz. 21st, Fort Schuyler, N. Y. 23d, Lonoke, Ark. 27th, Abilene, Gallinas, Grapevine, Panther, and Venus, Tex. 28th, New Braunfels, Tex. 29th, Cape Henry, Va.

Compared with the average date of first killing frost in the respective localities the killing frost of the 4th at Shreveport, La., was about seasonable; that of the 1st at Auburn, Ala., and of the 4th at Washington, Miss., was about one week early; that of the 4th at Mobile, Ala., was about 2 weeks early; that of the 1st at Augusta, Ga., and Wilmington, N. C., and of the 6th at Portland, Oregon, was about one week late; that of the 1st at Norfolk and Lynchburgh, Va., was about 2 weeks late; that of the 6th at Walla Walla, Wash., was about 3 weeks late; and that of the 27th at Abilene, Tex., was about one month late.

The first black frost of the season was reported at Raleigh, N. C., on the 1st; at Vicksburg, Miss., and Oswego, N. Y., on the 4th; at New York City and Cleveland, Ohio, on the 5th; at Holbrook, Ariz., on the 10th; at El Paso, Tex., on the 17th.

Light frost occurred as far south as north Florida on the 1st, 4th, and 5th; along the immediate east Gulf coast on the 1st, 2d, 4th, 5th, and 29th; in east Texas to the 29th parallel on the 4th, 26th, and 28th to 30th; to extreme south New Mexico and southeast Arizona on a number of dates; and in extreme southwest California from the 7th to 10th.

The first light frost of the season was reported at regular stations of the Signal Service, as follows: 1st, Kitty Hawk, N. C.; Charleston, S. C.; Savannah, Ga.; Jacksonville and Pensacola, Fla.; Mobile, Ala. 3d, Abilene, Tex. 4th, New Orleans, La.; Palestine, Tex. 6th, Fort Canby, Wash. 8th, Fort Bowie, Ariz. 10th, Fresno, Cal. 12th, El Paso, Tex.